

EXHIBIT C

PTO/SB/122 (09-03)

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Application Number	10/D18,078
Filing Date	June 16, 2004
First Named Inventor	MANLEY, Stephen Robert
Art Unit	3722
Examiner Name	Willmon Frdie Jr.
Attorney Docket Number	7350.0591.010

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Name Brian L. RibandoSignature *Brian L. Ribando*Date August 26, 2004Telephone 248 689 3500

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CENTRAL FAX CENTER**JUL 13 2005****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE****Applicant:** Stephen Robert Manley**Serial No.:** 10/018,076**Filed:** June 16, 2004**For:** HARD TURNING**Group Art Unit:** 3722**Examiner:** Willmon Fridle Jr.**In reply to:** Office Action dated June 16, 2004**CERTIFICATE OF MAILING****Date of Deposit with U.S. Postal Service:** 8/2/04.

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Kristina Black
Kristina Black

Mail Stop Amendment
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AMENDMENT**Sir:**

In response to the Office action of June 16, 2004, please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Amendments to the Drawings begin on page 10 of this paper and include both an attached replacement sheet and an annotated sheet showing changes.

Remarks/Arguments begin on page 11 of this paper.

An Appendix including amended drawing figures is attached following page 15 of this paper.

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Amendments to the Specification:

On Page 1 replace the title--Hard Turning--with Formation of a Surface Finish by Hard
Turning

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

25. (Cancelled).
26. (Currently Amended) A process according to claim ~~[[25]]~~ 46 in which the computer is also programmed to control the speed of rotation of the component.
27. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the computer is also programmed to control the relative axial movement between the tool and the component.
28. (Cancelled)
29. (Previously Presented) A process according to claim ~~[[25]]~~ 46 in which the programming is such as to increase the depth of cut during regularly spaced apart intervals.
30. (Currently Amended) A process according to claim 29 in which the timing of the intervals is adjusted from one revolution to the next so that the depressions do not become aligned parallel to the axis of the component.
31. (Previously Presented) A process according to claim 29 in which the timing of the intervals is such as to produce a plurality of depressions around each revolution of the component.
32. (Currently Amended) A process according to claim 31 in which the timing of the intervals is adjusted from one revolution to the next so that the depressions do not become aligned parallel to the axis of the component.
33. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the transition

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between the turned surface of the component and each such depression is gradual and is itself generated during more than one revolution of the component, by programming the computer to increase the depth of cut gradually over the said one or more revolutions during which the transition is to occur.

34. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein at one end of such a depression the computer programme is arranged to reduce the depth of cut in a similar gradual manner over a corresponding number of revolutions of the component, back to that required to produce the turned surface of the component beyond the depression.
35. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the component is to taper in overall diameter, and the depth of cut instructions generated by the programme during the transitions and during the generation of each reduced diameter region takes this into account, so that the diameter of the component is progressively reduced during the whole of the turning process.
36. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the final surface specification includes a bearing ratio vector requirement, which is achieved by adjusting the rate of change of radius ~~(diameter)~~ of the component at one or both ends of each depression so that the required percentage of component material will exist at the specified depths relative to the peak diameter of the turned surface.
37. (Cancelled)
38. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the final surface is to be capable of being tested at any point along its axial length, wherein

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the programme ~~is~~ arranged for the depressions to be ~~are~~ evenly distributed over the overall surface of the component to ensure that measurements made on the component will tend to be the same wherever they are made.

39. (Currently Amended) A process according to claim ~~[[25]]~~ 46 wherein the component is to be gauged as part of the control of the turning process, wherein the programme organises the computer to store ~~co-ordinates~~ coordinates of the depressions and transitions or an algorithm of their generation, so that an appropriate correction can be made to the result of any gauged value of ~~(say)-~~ the diameter, or the position at which a gauge is to be applied can be determined in advance of the gauging step and the gauge or the component positioned accordingly before the measurement is made.
40. (Currently Amended) A component when manufactured in accordance with a computer controlled hard turning process as claimed in claim ~~[[25]]~~ 46.
41. (Currently Amended) A programmed computer or computer programme for operating a computer, adapted to control the operation of a ~~metal machining~~ turning process ~~involving the removal of~~ for removing metal from a workpiece rotating ~~workpiece~~ about an axis by the engagement therewith of the tip of a non-rotating metal cutting tool, at least the position of which is controlled by the said computer, and which as a result of ~~synchronised~~ synchronized relative movement between the non-rotating tool and the rotating workpiece engages the workpiece a long a locus of points which define a helix that encircles the workpiece a plurality of times, and would produce a smooth machined surface thereon, wherein the programme serves to alter

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the instantaneous position of the tool so as to introduce into the otherwise smooth surface of the workpiece, during the machining process, plural spaced apart depressions for the purpose of simulating a surface typical of that which would be obtained thereon if the latter had been finished by grinding.

42. (Currently Amended) A metal turning machine in combination with a computer based control system therefore, when programmed to perform a hard turning process on a rotating workpiece involving the removal of metal from the surface of the rotating workpiece thereof by the engagement therewith of the tip of a non-rotating metal cutting tool, at least the position of which is controlled by the said computer based control system, and which as a result of synchronised synchronized relative movement between the non-rotating metal cutting tool and the rotating workpiece engages the workpiece along a locus of points which define a helix that encircles the workpiece a plurality of times, and would produce a smooth surface thereon, wherein the programme serves to alter the instantaneous position of the tool during the machining process, so as to introduce into the otherwise smooth surface plural spaced apart depressions, for the purpose of simulating a surface typical of that which would be obtained on the workpiece if the latter had been finished by grinding.
43. (Currently Amended) A method or apparatus according to claim [[25]] 46 further comprising the steps of gauging and/or measuring the machined part during the machining process, to generate signals indicative of one or more dimensions of the machined part, and supplying the signals to the computer, to assist in the control of the machining process.

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44. (Currently Amended) A machine tool in combination with a computer based control system therefore, when programmed to perform a machining process on a rotating workpiece, involving the removal of material from the workpiece by the engagement ~~with therewith~~ of a non-rotating cutting tool, at least the position of which is controlled by the said computer based control system and which, as a result of ~~synchronised~~ synchronized relative movement between the tool and the workpiece engages the workpiece along a locus of points which define a helix that encircles the workpiece a plurality of times, and would produce a smooth surface on the machined part, wherein the programme serves to alter the instantaneous position of the tool so as to introduce into the otherwise smooth surface of the machined part, plural spaced apart depressions during the machining process, for the purpose of simulating a surface typical of that which would be obtained thereon if the latter had been finished by grinding.
45. (Previously Presented) A machine tool according to claim 44, further comprising at least one gauging or measuring device adapted to perform measurements on the workpiece during the machining process, to generate signals indicative of one or more dimensions of the workpiece, and means for conveying the signals to the computer as feedback signals indicative of how the process is progressing, to assist in the control of the process.
46. (New) A turning process for producing a finished surface on the surface of a component, the process comprising:
rotating the component about a component axis,

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engaging the surface of the component with the tip of a tool,
moving the point of engagement between the tip of the tool and the surface of the component in the direction of the component axis as the component rotates around said axis whereby the locus of said point of engagement is a helix which encircles said component axis a plurality of times; and
increasing the depth of cut taken by the tip of the non-rotating tool at intervals during the turning process to create a plurality of depressions in the turned surface of the component, whereby the surface of the depressions and the surface of the component surrounding the depressions are formed during the same machining cycle and by the same tool.

47. (New) The turning process of claim 46 further comprising the step of altering the distance between the tip of the cutting tool and said component axis while rotating the component in order to create the plurality of depressions in the turned surface.
48. (New) The turning process of claim 46 further comprising the step of advancing the tool in the direction of the component axis by no more than the thickness of its cutting tip during each revolution of the component, so that the surface of the component, except for the depressions, is a smooth surface.
49. (New) The turning process of claim 46 further comprising the step of arranging each interval to extend over a plurality of consecutive revolutions of the component so that each resulting depression comprises an annular region of reduced diameter extending completely around the circumference of the component.

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50. A turning process in which a cutting tool engages the surface of a rotating component so as to remove a helix of metal therefrom as a result of synchronization of the relative axial movement of the tool and the component and the rotation of the latter, in which at least the depth of the cut achieved by the tool and component engagement is under the control of a computer which is programmed to increase the depth of cut at intervals during the turning process, so as to create in the turned surface a plurality of depressions which have a marginally smaller radius of curvature than that of the surrounding turned surface, and where a bluing gauge percentage figure has to be complied with, the computer is programmed to adjust the extent of the depressions relative to the remaining area of the turned component surface, so as to provide a sufficient overall area of turned surface which will be inked by the gauge during a bluing test, relative to the overall area of the depressions which will not normally become inked during the test.

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Amendments to the Drawings

Included herewith for the Examiner's approval is an Annotated Sheet showing changes to the drawings and a Replacement Sheet of Drawings. In Figure 2, reference numeral 10 should be reference number 12 to correspond with the description of the invention at page 10, lines 17-19.

Approval of the Replacement Sheet of Drawings is respectfully requested.

Attachment: Replacement Sheets

Annotated Sheets Showing Changes

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REMARKS/ARGUMENTS

Reconsideration of this application is respectfully requested.

This amendment revises the title of the application to be more descriptive of the invention.

This amendment revises the drawings to correct an error in Figure 2.

The indication of allowable subject matter presented by claim 37 is noted with appreciation. This amendment rewrites claim 37 in independent form as new claim 50 to include all of the limitations of the rejected parent claims.

This amendment further cancels former claims 25 and 28, and adds new claims 46 to 49.

Claim Rejections 35 U.S.C. § 102

Claims 25-28 are rejected under 35 U.S.C. 102(b) as being anticipated by McCarthy.

This rejection is respectfully traversed.

In order to be a proper rejection under 35 U.S.C. 102(b), the prior art reference must show each and every feature of the invention. McCarthy clearly fails to do this.

McCarthy shows a method and apparatus for forming recesses or highlights on a piece of jewelry such as an earring. In McCarthy, the earring is mounted on a moveable platform, and a spinning tool such as a diamond tool mounted on the end of a spindle is selectively brought into contact with the earring in order to form the highlights.

Applicant's device as disclosed and claimed is not at all similar to that shown in McCarthy. Applicant's device is for carrying out a turning process on a workpiece. It is well known in the art that the term "turning" refers to a type of machining operation in which the workpiece is rotated about an axis and the point of a tool is brought into contact with the

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workpiece. The workpiece rotates while the tool remains stationary and the cutting edge of the tool removes selected portions of the workpiece. The tool is usually advanced parallel to the axis of rotation of the workpiece so that the tool point traverses a part of or all of the workpiece along a path that is parallel to the axis of rotation of the workpiece. The locus of the point of engagement of the tool with the workpiece is a helix which encircles the workpiece a number of times.

McCarthy does not show a turning process for a workpiece. In McCarthy, the earring does not rotate around an axis while a tool traverses a part or all of the workpiece along a path that is parallel to the axis of rotation of the workpiece. In McCarthy, the locus of the point of engagement of the tool with the earring is not a helix that encircles the workpiece a number of times.

This amendment cancels claim 25 and adds new independent claim 46. Claim 46 recites a turning process for producing a finished surface on the surface of a component that includes the surface of the depressions and the surface of the component surrounding the depressions. As discussed above, McCarthy does not disclose a turning process and McCarthy does not show a process for finishing the surface of the depressions and the surface of the workpiece surrounding the depressions.

Claim 46 recites rotating the component about a component axis and moving the point of engagement between the tip of the tool and the surface of the component in the direction of the component axis as the component rotates around said axis whereby the point of engagement is a helix which encircles the component axis a plurality of times. These steps are not shown by McCarthy.

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Claim 46 recites increasing the depth of cut taken by the tip of the non-rotating tool at intervals during the turning process to create a plurality of depressions. In McCarthy, there is no turning process and accordingly depressions are not created during a turning process. Claim 46 further recites that the surface of the depressions and the surface of the components surrounding the depressions are finished during the same machine cycle and by the same tool. This limitation is nowhere shown in McCarthy since in McCarthy only the highlights of the earring are created by the tool, and the areas of the earring surrounding the highlights are untouched by the tool.

As a result, the rejection of claims 46 and 26-28 under 35 U.S.C. 102(b) on the basis of McCarthy is untenable and should be withdrawn.

Claim Rejections 35 U.S.C. § 103

Claims 29-36 and 38-44 are rejected under 35 U.S.C. 103 as being unpatentable over McCarthy. The Examiner relies on McCarthy's disclosure at column 7, lines 60-67 and column 8, lines 1-67 for the basis of the rejection.

The Examiner states that it would have been obvious to perform the claimed operations and to measure or gauge the necessary information from the tool and the workpiece in view of the teachings of McCarthy.

This rejection is respectfully traversed.

As discussed above, applicant's invention is directed to a turning process in which the workpiece is turned while being engaged by a tool. The tool is moved along the surface of the workpiece in the direction of the axis of rotation in order to finish the surface of the workpiece. Applicant's claims clearly recite the steps of rotating a component about a component axis, engaging the tip of a tool with the surface of the component, moving the point of engagement

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between the tip of the tool and the surface of the component in the direction of the component axis as the component rotates around the axis whereby the point of engagement between the tip of the tool and the surface of the component is a helix which encircles the component a plurality of times, and creating a plurality of depressions by increasing the depth of cut taken by the tip of the tool at intervals during the turning process so that the depressions and the surface of the component surrounding the depressions are formed by the same tool and during the same machine cycle. Applicant's independent claims 46, 41, 42 and 44, upon which claims 29-36, 38-40, and 43 depend, all contain these steps.

None of these steps are shown or rendered obvious by McCarthy since McCarthy is directed to an entirely different method, apparatus, and field of technology. Accordingly, it is believed that the rejection of applicant's claims under 35 U.S.C. 103 based on the reference to McCarthy is in error and should be withdrawn.

Allowable Subject Matter

The Examiner has indicated that claim 37 would be allowable if re-written in independent form to include all of the limitations of the base claim and any intervening claims. This amendment re-writes claim 37 as new claim 50 to include the limitations of the former base claim 25. Accordingly, claim 50 should be allowable.

New Claims

This amendment adds additional claims 47-49 which are dependent upon a new independent claim 46. It is believed that claims 47-49 are allowable over the prior art and recite elements of applicant's invention for which applicant is entitled to patentable protection.

The remaining prior art reference cited in this case has been reviewed with interest, but

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taken singly or in combination with McCarthy, does not appear to show, teach or render obvious applicant's invention as claimed.

For the foregoing reasons it is believed that this Amendment places the claims now appearing in this case in condition for allowance, and an early notice to such effect is respectfully solicited.

In the event that the Examiner does not agree that the claims are now in condition for allowance, he is courteously invited to contact the undersigned at the number given below in order to discuss any changes which the Examiner believes would lead to an allowance of the claims.

This amendment changes the number of independent claims in this case from 4 to 5, and changes the total number of claims in this case from 20 to 23. Thus, it is believed that additional fees of \$140 are required for the additional claims added by this amendment to the case. Enclosed herewith is the applicant's check in the amount of \$140 to cover the additional claim fees. If additional fees are necessitated by the entry of this amendment, authorization is hereby given to charge such fees to applicant's Deposit Account No 50-0852. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

REISING, ETHINGTON, BARNES, KISSELLE, P.C.



Brian L. Ribando
Registration No. 27,109
P.O. Box 4390
Troy, Michigan 48099
(248) 689-3500

Date: August 26, 2004

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Replacement Sheet
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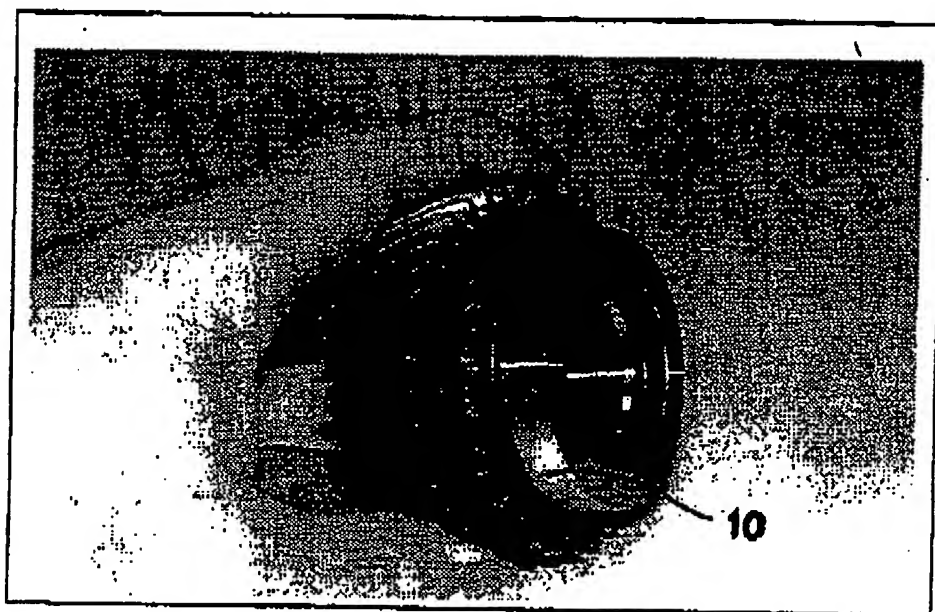
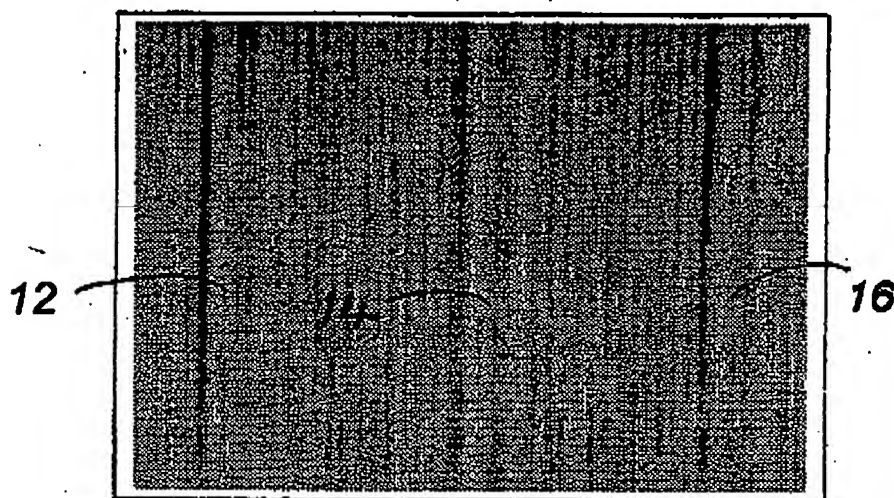


Fig. 1



Magnified view of surface
scale 35:1

Fig. 2

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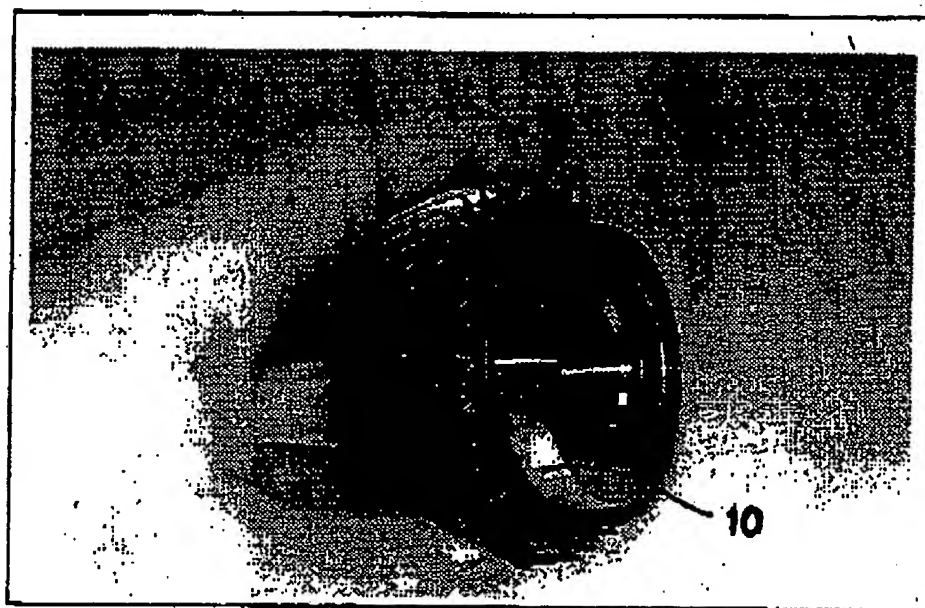
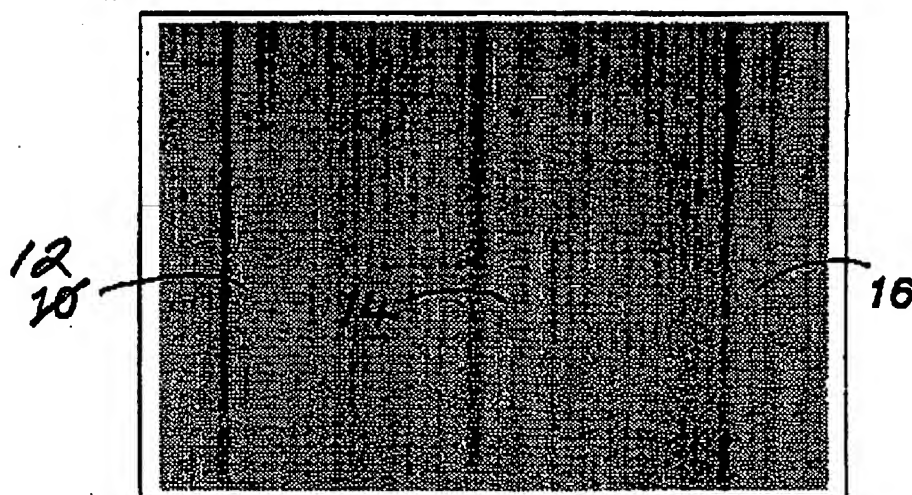


Fig. 1



Magnified view of surface
scale 35:1

Fig. 2

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